

WHAT IS CLAIMED IS:

1. A system for through-air drying paper webs comprising:
 - a first fabric for conveying a paper web;
 - a through-air dryer comprising a hood surrounding a drying cylinder,
 - 5 the through-air dryer being configured to convey a hot gaseous stream through a paper web traveling over the drying cylinder;
 - a throughdrying fabric being wrapped around the drying cylinder of the through-air dryer, the throughdrying fabric forming an endless loop; and
 - a transfer roll positioned outside the endless loop of the
 - 10 throughdrying fabric, the first fabric and the throughdrying fabric being wrapped around the transfer roll in an overlapping relationship, the transfer roll including a pressurized zone configured to emit a gaseous stream for facilitating transfer of a paper web from the first fabric to the throughdrying fabric, adjacent to the transfer roll.
- 15 2. A system as defined in Claim 1, wherein the throughdrying fabric is wrapped around the drying cylinder at least 270°.
3. A system as defined in Claim 1, wherein the throughdrying fabric is wrapped around the drying cylinder at least 285°.
4. A system as defined in Claim 1, wherein the throughdrying fabric is
- 20 wrapped around the drying cylinder at least 300°.
5. A system as defined in Claim 1, wherein the throughdrying fabric is wrapped around the drying cylinder at least 330°.
6. A system as defined in Claim 1, wherein the transfer roll comprises a rotatable roll.
- 25 7. A system as defined in Claim 1, further comprising a turning roll located downstream of the transfer roll along the through-air dryer, the throughdrying fabric being wrapped around the turning roll as the fabric leaves the drying cylinder of the through-air dryer, the turning roll in combination with the transfer roll determining the amount the throughdrying fabric is wrapped around
- 30 the drying cylinder of the through-air dryer.
8. A system as defined in Claim 7, further comprising a second fabric wrapped around the turning roll in an overlapping relationship with the throughdrying fabric, wherein a paper web is conveyed through the through-air

dryer by the throughdrying fabric, is fed in between the throughdrying fabric and the second fabric along the turning roll, and is then transferred to the second fabric.

5 9. A system as defined in Claim 7, wherein the turning roll is positioned outside the endless loop of the throughdrying fabric.

10 10. A system as defined in Claim 1, wherein the pressurized zone located on the transfer roll is configured to emit a gaseous stream at a pressure of at least 1 inch Hg.

11 11. A system as defined in Claim 1, wherein the pressurized zone located on the transfer roll is configured to emit a gaseous stream at a pressure of from about 4 inches Hg to about 60 inches Hg.

12 12. A system as defined in Claim 1, wherein the pressurized zone located on the transfer roll is configured to emit a gaseous stream at a pressure of greater than 1 atmosphere.

13 13. A system as defined in Claim 1, wherein a paper web is only in contact with conveying fabrics when conveyed into and out of the through-air dryer.

14 14. A system as defined in Claim 1, wherein the pressurized zone has a length and wherein the throughdrying fabric is wrapped around the transfer roll so as to substantially cover the entire length of the pressurized zone, the throughdrying fabric separating from the first fabric at about an end of the pressurized zone.

15 15. A system for through-air drying paper webs comprising:
25 a through-air dryer comprising a hood surrounding a drying cylinder, the through-air dryer being configured to convey a hot gaseous stream through a paper web traveling over the drying cylinder;
a throughdrying fabric being wrapped around the drying cylinder of the through-air dryer;
30 a first transfer fabric configured to convey a paper web to the throughdrying fabric, the first transfer fabric converging with the throughdrying fabric at a transfer point; and

a transfer roll positioned at the transfer point, the first transfer fabric and the throughdrying fabric being wrapped around the transfer roll in an overlapping relationship, and wherein a paper web is conveyed on the first transfer fabric, fed in between the first transfer fabric and the throughdrying fabric and then transferred to the throughdrying fabric prior to being conveyed around the drying cylinder of the through-air dryer, and wherein the transfer roll further includes a pressurized zone that facilitates transfer of a paper web from the first transfer fabric to the throughdrying fabric.

16. A system as defined in Claim 15, wherein the throughdrying fabric forms an endless loop, the transfer roll being positioned outside the endless loop.

17. A system as defined in Claim 15, wherein the throughdrying fabric is wrapped around the drying cylinder at least 270°.

18. A system as defined in Claim 15, wherein the throughdrying fabric is wrapped around the drying cylinder at least 300°.

19. A system as defined in Claim 15, wherein the throughdrying fabric is wrapped around the drying cylinder at least 330°.

20. A system as defined in Claim 15, further comprising a turning roll located downstream of the transfer roll along the through-air dryer, the throughdrying fabric being wrapped around the turning roll as the fabric leaves the drying cylinder of the through-air dryer, the turning roll in combination with the transfer roll determining the amount the throughdrying fabric is wrapped around the drying cylinder of the through-air dryer.

21. A system as defined in Claim 10, further comprising a second transfer fabric wrapped around a turning roll in an overlapping relationship with the throughdrying fabric, wherein a paper web is conveyed through the through-air dryer by the throughdrying fabric, is fed in between the throughdrying fabric and the second transfer fabric along the turning roll, and is then transferred to the second transfer fabric.

22. A system as defined in Claim 15, wherein the pressurized zone located on the transfer roll is configured to emit a gaseous stream at a pressure of at least about 4 inches Hg.

23. A system as defined in Claim 15, wherein a paper web is only in contact with conveying fabrics when conveyed into and out of the through-air dryer.

24. A tissue making system incorporating the through-air dryer system of Claim 14.

25. A tissue making system as defined in Claim 24, comprising a head box configured to contain an aqueous suspension of papermaking fibers and for depositing the aqueous suspension onto a forming fabric.

26. A system as defined in Claim 15, wherein the throughdrying fabric is wrapped around the drying cylinder at least 345°.

27. A system as defined in Claim 15, wherein the pressurized zone has an upstream end, a downstream end, and a length and wherein the throughdrying fabric is wrapped around the transfer roll over the entire length of the pressurized zone, the throughdrying fabric separating from the transfer fabric at about the downstream end of the pressurized zone.

28. A drying apparatus comprising:
a drying cylinder;
a drying fabric wrapped around at least a portion of the drying cylinder, the throughdrying fabric being in the shape of an endless belt, the endless belt having an upstream end prior to the drying cylinder and a downstream end after the drying cylinder; and
a transfer roll positioned at the upstream end of the drying fabric and a turning roll positioned at the downstream end of the drying fabric, the transfer roll and the turning roll being positioned outside the endless loop, and wherein the transfer roll includes a pressurized zone configured to emit a fluid stream for transferring a web from a transfer fabric to the drying fabric.

29. An apparatus as defined in Claim 28, wherein the transfer roll and the turning roll are positioned such that the throughdrying fabric is wrapped at least 295° around the drying cylinder.

30. An apparatus as defined in Claim 29, wherein the transfer fabric is wrapped around the transfer roll in an overlapping relationship with the drying fabric, and wherein a paper web conveyed on the transfer fabric is fed in between

the transfer fabric and the drying fabric along the transfer roll and then transferred to the drying fabric.

31. An apparatus as defined in Claim 30, wherein the transfer fabric is positioned adjacent to the transfer roll.

5 32. An apparatus as defined in Claim 28, wherein the drying apparatus comprises a through-air dryer.

33. An apparatus as defined in Claim 32, wherein the apparatus further comprises a hood surrounding the drying cylinder, the through-air dryer being configured to convey a hot gaseous stream through a paper web passing in
10 between the hood and the drying cylinder.

34. A process for making a tissue web comprising:
forming a wet tissue web by depositing aqueous suspension of
papermaking fibers onto a forming fabric;
partially dewatering the wet tissue web;
15 conveying the tissue web from a transfer fabric to a throughdrying fabric, the tissue web being contacted by a fluid stream that pushes the web from the transfer fabric to the throughdrying fabric as the web is being conveyed in between the two fabrics around a transfer roll;
drying the tissue web in a throughdryer as the web is conveyed on
20 the throughdrying fabric, the throughdryer including a drying cylinder, the throughdrying fabric and the tissue web being wrapped around the drying cylinder at least 300°; and
winding the dried web onto a parent roll.

35. A process as defined in Claim 34, wherein the throughdrying fabric
25 and the tissue web are wrapped around the drying cylinder at least about 330°.

36. A process as defined in Claim 34, wherein the throughdrying fabric forms an endless loop around the drying cylinder, the transfer roll being positioned outside of the endless loop.

37. A process as defined in Claim 34, wherein after the wet tissue is
30 deposited onto a forming fabric, the web only contacts fabrics until being wound into a parent roll.

38. A process as defined in Claim 34, wherein the wet tissue web does not contact any paper machine rolls during the process.

39. A process as defined in Claim 34, wherein the fluid stream that contacts the tissue web comprises a gaseous stream, the gaseous stream being at a pressure of from about 4 inches Hg to about 60 inches Hg.

5 40. A process as defined in Claim 34, wherein the dried web has a bulk of at least 6cc/g.

41. A process as defined in Claim 34, wherein the dried web has a basis weight of from about 6 gsm to about 80 gsm.

10 42. A process for increasing the drying capability of a through-air dryer, the through-air dryer comprising a hood surrounding a drying cylinder, the through-air dryer being configured to convey a hot gaseous stream through a paper web traveling in between the hood and the drying cylinder, a throughdrying fabric being wrapped around the drying cylinder for conveying a paper web over the drying cylinder, the through-drying fabric being placed adjacent to a vacuum device at an upstream end of the through-air dryer, the vacuum device for transferring a wet
15 paper web from a transfer fabric to the through-drying fabric, the process comprising the steps of:

replacing the vacuum device with a positive pressure transfer roll, the transfer roll including a pressurized zone configured to emit a gaseous stream for facilitating transfer of a wet paper web from the transfer fabric to the throughdrying
20 fabric; and

increasing a wrap angle of the throughdrying fabric around the drying cylinder by at least 10%.

43. The process as defined in Claim 42, wherein the wrap angle is at least 300°.

25 44. The process as defined in Claim 42, wherein the wrap angle is at least 330°.

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